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GAS ABSTRACTS

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1. GAS INDUSTRY

New England Standby

White, B. C. STAND-BY SOLUTION FOR NEW ENGLAND. *Gas Age*, 115, 34-39 (1955) February 24.

Discussion and brief analysis of construction and annual costs of various types of standby and peak shaving facilities. Types discussed include: propane plants with refrigerated storage, underground storage, and storage under pressure in tanks; gas storage under pressure in tanks, spheres, bottles, or pipe batteries, and storage of liquefied natural gas. G. G. Wilson

Employee Selection

Beamish, J. C. HOW MILWAUKEE GAS "JOB TESTS" ITS EMPLOYEES. *Gas Age*, 31, 73 (1955) February; *Gas*, 31, 73, 74, 78, 82, 84 (1955) February.

Milwaukee Gas has recently initiated a new testing program. All candidates for supervisory positions are now tested; all applications for initial employment and all candidates for promotion or transfer are also tested. Three areas are involved: (1) General level of mental ability, (2) special skills and knowledge required for the position in question, and (3) personality and interest. Although of fairly recent origin, its success can be evidenced by the growing acceptance at all levels throughout the company. All available evidence indicates that testing can provide reliable, valuable data that can not be secured in any other way. Using this data, supplemented with other information, personnel selection is greatly improved.
C. A. Simms

Gas Purchase Accounting

Brockwell, P. A. HOW TO SPEED UP GAS PURCHASE ACCOUNTING. *Pipe Line Ind.*, 2, 64-66 (1955) February.

Warren Petroleum Corporation has applied punched card techniques to its purchase and payment for natural gas from some 3000 leases used in its 20 natural gasoline plants. A completely detailed procedure for making these calculations is given. B. E. Eakin

Industry Legislation

Shivers, A. THE CHOICE: NATIONALIZATION OR PRIVATE ENTERPRISE. *Indep. Petroleum Assoc. Amer. Monthly*, 25, 43-44, 46, 48 (1955) February.

The FPC interpretation of the Supreme Court decision upholding the Phillips case ruling indicates the possible establishment of a monopoly of our natural resources. Fundamental principles of our way of government are involved. The traditional relationships between state and federal government have been set aside. The decision establishes rules antagonistic to private enterprise, and the application of these rules is not limited only to control of gas and oil production. B. E. Eakin

GAS ESCAPE CLAUSE TESTED. *Oil Gas J.*, 53, 130 (1955) March 21.

A description of the legal question before the F.P.C.: can producers cancel delivery contracts to use the gas in a cycling program and thereby escape Federal regulation? R. F. Bukacek

Information Indexing

LOGIC FOR LITERATURE. *Chem. Week*, 76, 40-41. March 5, 1955.

Under the direction of Mortimer Taube, the new firm, Documentation, Inc., is ready to offer to the scientific and technical world, its chemical patent service. The system is based on the use of single-word indexing categories, and is called Uniterm. It works in much the same way as a computer, using words instead of numbers. Although the expense to a subscriber may seem high, $1000 a year, the firm claims that chemical patent indexing costs can be cut from $5 per patent to about 17¢. The logical and systematic simplicity of this new system when and if applicable to the full run of scientific literature, may be the answer to one of researcher's most pressing problems, that of keeping up with the rapidly increasing amount of technical information. C. A. Simms

Manpower Demands

THE GREAT MANPOWER DEBATE. *Chem. Eng. Progress*, 51, 107-09 (1955) March.

The Engineering Manpower Commission's

statement of March 1 by M. M. Boring before the House Armed Service Subcommittee is reviewed. The interest and attempts in obtaining proper balance, instead of competition, between the military reserve and the productive labor force in their demands for scientific and engineering personnel is shown by the presence of five bills before the 84th Congress (H. R. 2967, H. R. 3005, H. R. 2847, S. 969 and S. 2). The Administration's Bill, H. R. 2967, proposes a realistic Reserve plan which includes order in mobilization, ready reserve, constant screening of ready reserve to avoid retention of oversupply of skills, standby reserve called by selection, transfers between reserves (after review), and six-month military training program. Its deficiency lies in retention of all discretion by the military, and the EMC asks for a Manpower Board with effective civilian representation to cooperate in establishing the criteria, priorities and allocations. Since the margin of skilled manpower for war production is extremely narrow, such legislation would relieve the current Selective Service inroads and ward off a chaotic breakdown in an emergency.

O. P. Brysch

New Mexico Gas

Ximenes, V. T. NATURAL GAS IN NEW MEXICO. New Mexico Studies in Business and Economics No. 3. Univ. New Mexico, Albuquerque, 73 pp. (1954) June.

After a review of the development, reserves and production of natural gas in New Mexico, the author discusses the price, consumption and state conservation. In order that some reserve be maintained for the future, and that the State receive an increased share of gas benefits at present, it is recommended that 1) the severance tax be based on volume of gross production and not marketed value, 2) a gathering tax of 1 cent per MCF be levied, 3) liquid hydrocarbons should be taxed 4 to 5 cents per barrel gross production, 4) carbon black manufacture be restricted by a tax of 4 to 5% of market value,—with provisions for change as better statistical information is gathered.

O. P. Brysch

2. APPLIANCES

Air Conditioning

Laube, H. L., Diehl, A. E., Gonzalez, R. A., toeLaer, C. M., Faigen, B., Beemsterboer, P. B. AIR CONDITIONER CONFERENCE. *Refrigerating Eng.*, 63, 53-63 (1955) February.

Reports are given on the following papers presented at the Residential Air Conditioner Conference held at the 50th Annual Convention of the American Society of Refrigerating Engineers at Philadelphia: The Engineer's Opportunities and Responsibilities; Air Conditioning and Refrigeration Standard 6-10 (for computing heat gain); A Chart Method of Equipment Selection; Residential Heat Gain Estimation, G. E. Method; Carrier's Twenty-Four Hour Method; and Some Problems in Cooling Existing Homes.

J. F. Reed

Pennington, N. A. (assigned to Robert H. Henley and to Hoar, R. S.) HUMIDITY CHANGER FOR AIR-CONDITIONING. U. S. 2,700,537 (1955) January 25.

Two rotating cylinders packed with inert filamentous material are used for heat and moisture transfer between 2 different air streams exposed to different sectors of the cylinders. Air to be conditioned passes through a cylinder impregnated with hygroscopic solution or salt and is dehumidified. It further passes through a cooled cylinder, then to the conditioned space. Air from the conditioned space returns and passes through a wetted mat and is adiabatically cooled. This cool air passes through a different sector of the cooling cylinder whereby the cylinder becomes cooled. The air is further passed through a heated zone and through a sector of the cylinder impregnated with hygroscopic agent which thus becomes concentrated ready for the next cycle of dehumidification of fresh air.

J. F. Reed

Dryer Sales

CONTEST BRINGS BIG INCREASE IN EAST OHIO'S CLOTHES DRYER SALES. *Gas*, 31, 65 & 68 (1955) February.

A sales incentive contest, beamed at increasing the sales of gas-fired clothes dryers in the service area of the East Ohio Gas Co., is out-

lined in this article. An extensive advertising program, and prize awards to stimulate domestic appliance salesmen, produced a resultant 50% increase in clothes dryer sales volume. Each salesman was supplied with a sales promotional kit that is considered in the article.
Publishers' Abstract

Hot Water Heating System

Dunningham, A. C. PRESSURE HOT WATER. *Fuel Efficiency*, 3, 204-06 (1955) January.

The application of pressure hot water to space and process heating is well worth consideration, primarily because it makes possible a high over-all thermal efficiency without any condensate problems. It also simplifies boiler operation by eliminating water purification plant and continuously operating feed pumps. It evens out peak loads on the boiler but, in cases where the temperature difference between flow and return water is small, it very much limits the efficiency of economisers, and so favours the use of the economic type of boiler. Pressure hot water is much less flexible than a well-designed and well-operated steam plant as regards rate of heating and temperature control and its application should be considered in relation to the heat and temperature requirements of the plant. A number of plant units requiring different temperatures involves the complication of subsidiary circulation systems each maintained at its own temperature, whereas steam can be controlled readily at any required temperature by regulation of the pressure. In making a choice between steam and pressure hot water, it should be borne in mind that with a good condensate recovery system, steam forms in effect a closed circuit with a high over-all thermal efficiency of the same order as that of pressure hot water. In practice, however, the efficient recovery of condensate presents many difficulties and because of condensate losses, steam is often less efficient than pressure hot water. For this reason the latter, assuming a high standard of maintenance and insulation may, in many cases, prove to be economically advantageous and in the interest of national fuel efficiency. Author's Abstract

Industrial Burner

Bonvillian, C. A., Brierly, R. C. and Latvin S. APPARATUS FOR THE COMBUSTION OF FUEL. U. S. 2,701,011 (1955) February 1.

The invention provides means for combustion of fuels and other substances, preferably at relatively high heat releases, and changes the state of aggregation of combustibles and vaporizable substances distributing them to assure more complete combustion. It is applicable to uses such as disc, grid or ring burners, gas turbine systems, fluid heaters, rocket or jet propulsion devices, vapor generators, fog dispelling apparatus and apparatus for drying, smelting, sintering or baking. J. G. Chalcraft

Panel Cooling

Schutrum, L. F., Vouris, J. and Min, T. C. PRELIMINARY STUDIES OF HEAT REMOVAL BY A COOLED CEILING PANEL. *Heating, Piping and Air Cond.*, 27, 241-45 (1955) January.

Heat removal from a room by a cooled ceiling panel was investigated, as was the temperature distribution in the cooled room. Sufficient experimental observations were made in the Laboratory under steady-state conditions to prove that the heat transfer in a room cooled by a ceiling panel is comparable to that in a room heated by a floor panel (Inversion Principle). Non-uniform temperatures of the four walls and floor could be represented by an area-weighted average temperature. (Average Uncooled Surface Temperature).
Authors' Abstract

Solar Radiation

Threlkeld, J. L., and Jordan, R. C. SOLAR RADIATION DURING CLOUDLESS DAYS. *Heating, Piping and Air Cond.*, 27, 117-122 (1955) February.

This paper presents the results of research on the incidence of solar and sky radiation during cloudless days on horizontal, south-facing vertical and south-facing tilted surfaces. Calculated curves based upon an assumed standard summer atmosphere and an assumed standard winter atmosphere are presented. Comparisons of the calculated curves with recorded clear day radiation measurements are made for Lincoln, Neb.; Madison, Wis.; Columbia, Mo.; Rapid City, S. D.; Nashville, Tenn.; and Blue Hill, Mass. Authors' Abstract

Water Heating Competition

Carroll, A. L. GAS VS OIL IN WATER HEATING. *Amer. Gas Assoc. Monthly*, 37, 14-16 (1955) February.

Three objectives were undertaken in this study: comparative fuel cost of gas to oil; market potential of gas water heating in the territory; and the effect on revenue of adding the water heating load. There were wide variations in the fuel use as individual families for domestic hot water supply, with gas or oil. Heating hot water by gas is competitive with oil in the test territory, the average cost of natural gas for this purpose is approximately $2.15 per MCF and No. 2 fuel oil is selling for 13½ cent per gallon. J. G. Chalcraft

McGuckin, J. GAS OVER OIL FOR RESIDENTIAL HEATING. *Gas Heat*, 6, 25 (1955) February; Amer. Gas Assoc. Monthly, 37, 6, 7, 46 (1955) April.

An impartial study was made to determine efficiency of gas over oil for heating the typical home. The actual amount of fuel consumed by comparable gas and oil-fired domestic heating equipment was determined by sixty-four separate comparisons. All figures were converted to show therms (100,000 Btu) of 140,000 Btu/gal. #2 domestic fuel oil and of 720 Btu/cu.ft mixed gas consumed per day and per hourly Btu heat loss (0° to 70° F.) Results show 1000 gas Btu are = to 1458 oil Btu, that operating efficiency of gas equipment is 46% greater, and that 7.5 gallons of oil are required to do the job of 1000 cu.ft of 720 Btu gas. (See *Gas Abs.*, 11, 39) J. G. Chalcraft

3. COMBUSTION AND INDUSTRIAL FURNACES

Burner Design

Prigg, J. A. AERATED BURNERS. *Gas Times* (British), 82, 221-22, 224 (1955) February 18; *Gas J.* (British), 281, 654, March 9; 723-4 (1955) March 16.

The data required for the design of aerated burners and its underlying theory are discussed briefly. The theoretical aspects are first discussed; the second part is concerned with the design of aerated burners for practical needs. A review is given of burners having special features such as self-extinguishing injectors, pre-ignition or total aeration. The injector orifice, flame port area, burner head, throat, tube, air port and air control, are discussed with the aid of a sketch. J. G. Chalcraft

Chimney Design

Sherlock, R. H. and Lesher, E. J. DESIGN OF CHIMNEYS TO CONTROL DOWN-WASH OF GASES. *Amer. Soc. Mech. Eng. Trans.*, 77, 1-9 (1955) January.

Experimental data from wind-tunnel tests on a power station model has been correlated in the form of diagrams usable for design purposes. The diagrams show the relationship between critical-velocity ratio (velocity of stack gases to the velocity of the wind), height of stack and height of gas plume and are applicable to plant buildings 300 ft. long and stack heights of 250 ft. to 450 ft. A design method is illustrated for determining station building and stack heights so that the down-wash of the smoke plume toward the ground due to aerodynamic effects can be minimized. E. J. Pyrcioch

Flame Research

Dugger, G. L. and Simon, D. M. PREDICTION OF FLAME VELOCITIES OF HYDROCARBON FLAMES. Nat. Adv. Comm. Aeron. Report 1158 (1954).

The Semenow equation based on a thermal mechanism, the Tanford-Pease equation based on active particle diffusion, and the Manson equation based on the pressure drop across the flame front are tested using hydrocarbon-air flames. In each equation, one parameter is considered arbitrary, permitting comparison of relative burning velocities. The equations are capable of predicting flame velocities to approximately 5%, when the hydrocarbon, the initial temperature of the reactants, or the equivalence ratio is varied. Empirical equations are also presented which, through the use of a greater number of arbitrary parameters, predict flame velocities to approximately 3%. S. A. Weil

Dugger, G. L., Weast, R. C., and Sheldon, H. FLAME VELOCITY AND PREFLAME REACTION IN HEATED PROPANE-AIR MIXTURES. *Ind. Eng. Chem.*, 47, 114-116 (1955) January.

The effect of initial mixture temperature on the flame velocity of propane-air flames is discussed. The usually observed increase in mixing velocity with preflame temperatures does not occur, if preheating time is greater than 1 second and the initial mixture temperature is greater than 800° K. This effect may be due to the formation of water and carbon dioxide prior to the reaction zone and their resultant behavior as inert diluents in the flames proper.

S. A. Weil

Kurz, P. F. FLAME-STABILITY STUDIES ON AN INVERTED BUNSEN BURNER. *Ind. Eng. Chem.*, 47, 121-26 (1955) January.

Flame-stability studies have been carried out on an inverted Bunsen burner. The experimental work dealt with a comparison of the stability limits of upright and inverted flames of single and mixed hydrocarbon fuels and with the influences of nitrogen on the stability limits of hydrocarbon-air mixtures. A Smithells tube to exclude ambient air from the environs of the burner port is essential. Unshielded flames curl upward and move about under the influence of random currents in the ambient air. Fuel and air flows were metered by means of critical flow orifices. Compressed air from commercial cylinders was used in the experimental work in order to ensure close control over the air flow at all times. Author's Abstract

Penner, S. S. and Bjoernerud, E. K. EXPERIMENTAL DETERMINATION OF ROTATIONAL TEMPERATURES AND CONCENTRATIONS OF OH IN FLAMES FROM EMISSION SPECTRA. *J. Chem. Phys.*, 23, 143-152 (1955) January.

OH rotational temperatures were determined for acetylene and hydrogen flames at the tips of the inner cones. Using the two path method developed by Penner, these workers obtained "anomalous" temperatures. However, by making assumptions concerning the spectral lineshapes and approximate connections for self-absorption, values comparable to calculated adiabatic temperatures were obtained.

S. A. Weil

Forging Furnaces

McCormick, G. C. UTILIZATION OF INSULATING REFRACTORY LININGS IN SLOT-TYPE FORGE FURNACES. *Ind. Heating*, 22, 156, 158, 160, 161 (1955) January.

Spring mounted, insulating-fire-brick lined forging furnaces have many advantages over those lined with hard fire brick. Reduced fuel costs, increased productivity and reduced maintenance have been found. Plots are presented showing relative heat storage, heat loss and furnace casing temperatures for the two types of brick.

R. T. Ellington

Furnace Blast Compressor

Sédille, M. H. (assigned to Societe Rateau (Societe Anonyme) Paris.) COMBINED SUPERCHARGED BLAST-FURNACE AND GAS TURBINE PLANT. U. S. 2,701,443 (1955) February 8.

For a supercharged, sealed blast furnace, the invention claims the use of blast-furnace gas as fuel for a gas turbine which drives the centrifugal compressor providing the high pressure air blast. The furnace gas passes in order through a heat exchanger, dust separator and gas compressor, then to a combustion chamber where it meets part of the incoming air supplied by a centrifugal compressor and burns to provide driving-gases for the turbine which powers both air and gas compressor. The total incoming air is warmed by a primary exchanger, and the major part (not used in combustion chamber) is further preheated by a second exchange with the combustion chamber products before passing to the blast-furnace tuyeres. Metallic recuperators or ceramic regenerators may be used in the final heat exchange. The gas turbine shaft also may drive a generator. Such a generator may be arranged to drive electrically the first gas compressor instead of using mechanical drive of the turbine.

O. P. Brysch

Furnace Design

Henshilwood, C. P., and Patrick, E. A. THE EFFECT OF OPERATING VARIABLES

AND PERMEABLE LININGS UPON FURNACE PERFORMANCE. *J. Inst. Fuel* (British), 28, 17-29, 42 (1955) January.

Detailed analyses are presented of tests on a furnace which could be operated either with conventional flues or as a permeable hearth. For a fully loaded and properly controlled furnace, permeable construction seems to have definite advantage. R. T. Ellington

Heated Processing Tanks

Abram, J. C. SOLUTION TANKS PROVIDE YEAR-AROUND MARKET ACROSS THE COUNTRY. *Butane-Propane News*, 17, 32-34 (1955) February.

The advantages in heated solution tanks for cleaning, rinsing, plating, pickling, coloring and heat treating of metal parts are reviewed as a country-wide market for LP-gas. Many applications and specific types of installations are described. J. G. Chalcraft

Heat Treating Atmospheres

Kalish, H. S. and Mazza, E. N. AN EVALUATION OF DISSOCIATED AMMONIA AND HYDROGEN ATMOSPHERES FOR SINTERING STAINLESS STEEL. *J. Metals, AIME Trans.*, 304-310 (1955) February.

The effect of sintering types 302, 302B, and 430 stainless steel powder compacts in hydrogen and dissociated ammonia was investigated. It was found that sintering in dissociated ammonia resulted in as much as 0.5 wt pct increase in the nitrogen content of stainless steel even though the dissociation of the gas was complete. Sintering in hydrogen, on the other hand, reduced the nitrogen content of the stainless steel to less than 0.01 wt pct. In the case of the 302-type stainless steel, the low nitrogen content resulted in a material that was largely ferritic, whereas the high nitrogen content rendered the material fully austenitic. Sintering in dissociated ammonia resulted in lower density, generally lower tensile strength, less ductility, and higher hardness than sintering under equivalent conditions in hydrogen. The reduction of oxides on both stainless steel and iron particles was found to be effected by hydrogen partial pressure in the sintering atmosphere. Compacting pressure was found also to effect oxide reduction during sintering.

Authors' Abstract

Smog Blame

SMOG BLAME SHIFTS. *Oil Gas J.*, 53, 67-68 (1955) January 17.

Efficient air-pollution controls have made the oil industry one of the lesser contributors to smog in Los Angeles. Research has indicated that automobile exhausts, especially during idling and deceleration, are the chief source of hydrocarbons in the air. The article discusses some possibilities of engine modification that could remedy this problem and improve performance and economy in so doing. A. J. Tulis

Space Heating

Myler, W. M., Jr. AFTER-MIX SCHEME TEMPERS MAKE-UP AIR FOR FOUNDRY. *Heating, Piping and Air Cond.*, 27, 98-100 (1955) February.

Uncontrolled infiltration, as result of a special exhaust system to remove abrasive dust, was causing great discomfort to workers in this small foundry. Not only that, the negative pressures were interfering with combustion in the unit heaters. The author explains how an after-mix system was used with direct gas-fired duct heaters to provide adequate tempered make-up air for comfort, proper exhaust system performance and good equipment operation. Author's Abstract

4. GASIFICATION AND CARBONIZATION

Carbonizing Variables

Smith, F. W. and Reynolds, D. A. THE EFFECT OF TEMPERATURE, CHARGE DENSITY, AND BLENDING ON THE CARBONIZATION OF COAL. U.S. Bur. Mines Rep. Inv. 5110 (1955) February.

Effects of temperature, coal bulk density and blending upon the products of coal carbonization are discussed from the basis of results in the BM-AGA apparatus, the sole-heated oven, and the vertical expansion oven. Effects of temperature upon coke yield, tar yield, coke hardness index and force exerted upon oven walls are described with the aid of graphs, in which all data over the range of coking coals is referred to values obtained at 800° C. The increase of wall force with increasing tempera-

ture remains open to question. Similarly, ¼-inch and 1-inch tumbler index, wall force and 1½-inch shatter index are shown to be influenced by increasing bulk density, the first three being increased and the fourth decreased when referred to a 50 lb per cu ft basis. In similar fashion the effect of blending 20% of low volatile coal is shown over a range of high-volatile coals, so that the effects of temperature, bulk density and blending upon the products can be predicted from a single carbonizing test on the high-volatile coal. O. P. Brysch

Coal Constitution

Van Krevelen, D. W. THE PROBLEM OF COAL CONSTITUTION—THE THIRD COAL SCIENCE LECTURE. *Brit. Coal Utilis. Res. Assoc. Gazette*, No. 24, 6-19 (1954).

A review of the methods employed in the nondestructive examination of the coal substance is presented. Elementary composition and density of the coal material provide a quantitative insight into their aromatic nature and their degree of ring condensation while the refractive index in combination with the above properties serve as a best guide in estimating the size of the condensed aromatic systems.

K. C. Channabasappa

Coal Mineral Reactions

Whittingham, G. HIGH TEMPERATURE REACTIONS OF COAL MINERALS DURING COMBUSTION. *Brit. Coal Utilis. Res. Assoc. Monthly Bull.*, 18, 581-590 (1954) December.

The author presents a survey of published information on decomposition and secondary reactions of sulfides and carbonates in coal during combustion under reducing and oxidizing conditions. C. G. von Fredersdorff

Coke Fissuring

Soulé, J. L. THE PROCESS OF FISSURING IN COKE. *Fuel* (British), 34, 68-77 (1955) January.

The author presents an explanation of the fissuring tendency of a coal during the carbonization process, based upon experimental studies of the contraction of the resolidified plastic mass. Because the maximum contraction coefficient (d length/ d temp.) occurs at the resolidification temperature, the free contraction normal to the heat flow tends to build the solidifying material into a curved layer which is convex to the heat source. This continues up to a layer thickness of 6 to 25 mm. (depending on the kind of coal), when the thickened mass can no longer curve to relieve the internal stresses and the hot face ruptures into fissures. Applications to coal blends and heating practice are mentioned. O. P. Brysch

Dust Removal

Munger, H. P. (assigned to The Battelle Development Corp.) ATMOSPHERIC CONTAMINANT COLLECTOR. U. S. 2,699,679 (1955) January 18.

This patent relates to an atmospheric gas and contaminant collector which segregates particulate matter according to wind velocity and wind direction. It eliminates the recording of wind direction and velocity and the laborious comparison at the end of a test period, with accompanying inaccuracies. Several of these devices in a large industrial area having many sources of contaminants, may be used as monitoring devices, whereby offending sources of contaminants can be readily located.

D. J. Dennison

Gasification of Coal

Elliott, M. A., Corey, R. C., and Perry, H. (assigned to the United States of America) APPARATUS FOR CONDUCTING HETEROGENEOUS CHEMICAL REACTIONS. U. S. 2,703,275 (1955) March 1.

The gasification of pulverized coal is conducted in a cyclone type reactor which has provision for introducing fluid reactants through multiple peripheral slots and powdered fuel through a rotating disc mechanism.

C. G. von Fredersdorff

Totzek, F. (assigned to Koppers Co., Inc.) METHOD AND APPARATUS FOR PREHEATING GASEOUS AND VAPOROUS REAGENTS IN POWDERED FUEL GASIFICATION. U. S. 2,702,743 (1955) February 22.

A system is described for the continuous gasification of pulverized solid fuel, comprising means for partial combustion in an annular

type burner which has provision for a) introducing superheated, steam through an annulus surrounding the coal stream and b) recycling a portion of the hot gaseous products to the burner inlet as an expedient to preheat the coal suspension. C. G. von Fredersdorff

Totzek, F. (assigned to Koppers Co., Inc.) GASIFICATION OF POWDERED FUEL AND USE OF A PROTECTIVE GAS. U. S. 2,702,744 (1955) February 22.

A powdered coal gasifier is described incorporating downflow injection of oxygen and fuel with subsequent admission of a protective blanket of steam along the reactor shell. Product gases are recycled from a holder to insure consumption of oxygen in the event of failure in coal delivery. C. G. von Fredersdorff

Pressure Gasification

Grindrod, J. GAS FROM BROWN COAL IN VICTORIA, AUSTRALIA. *Gas World* (British), 141, 324-25 (1955) January 29.

To make use of the large deposite of non-coking brown coal found in Gippsland, Eastern Victoria, a plant for the production of town gas by the Lurgi high-pressure gasification process is being erected at Morwell, Victoria. The gas will be transmitted to Melbourne in 18-in steel welded pipe over a distance of 102 miles. A liquid fuel synthesis unit is planned on being added to the gas producing plant with operation of the first synthesis unit anticipated by 1960. E. J. Pyrcioch

TOTAL GASIFICATION OF BRITISH FUELS BY THE LURGI PROCESS. *Coke and Gas* (British), 17, 10-16 (1955) January.

The Lurgi pressure gasification process is examined in the light of recent experimental work on the effect of coal properties and operating variables as reported by the Institution of Gas Engineers. Volatile matter contributes to methane formation by direct hydrogenation. A large proportion of the methane content of Lurgi gas appears to be attributable to hydrogenation of carbon in the upper portions of the fuel bed. Typical plots of temperature and composition distribution in the fuel bed are included. Caking coals were handed successfully by incorporating a stirrer in the Lurgi unit. Future work on operating under slagging conditions is contemplated. (See also *Gas Abs.* 11, 62) C. G. von Fredersdorff

Reformed Gas

Bailey, E. G., and Hardgrove, R. M. (assigned to The Babcock & Wilcox Co.) PROCESS FOR THE THERMAL CONVERSION OF LIQUID AND GASEOUS HYDROCARBONS. U. S. 2,696,511 (1954) December 7.

Fluidized, inert solid, heat transfer material is passed downward countercurrently in three superposed chambers, with preheating to above-cracking temperatures in the topmost, converting the hydrocarbon (natural gas, LP-gas, gas oils) in the second with steam, and burning off carbon in the lower chamber, then passed upward by elevator to be recycled. Adjustable inlets for hydrocarbon and steam are used to control the residence time of cracked vapors in the hot zone. O. P. Brysch

Underground Gasification

Machelson, S. G. UNDERGROUND GASIFICATION OF COAL. *Gas Age*, 115, 31-33, 68 (1955) February 10.

Briefly reviewed are tests in underground gasification of coal conducted in Russia, the United States and in Great Britain. The Russians are credited with being the first in conducting field experiments beginning in 1933 and in operating an industrial station in 1940. Since the end of the war, there have been very few references on this topic in Russian literature. American field tests were carried out at Gorgas, Ala., beginning in 1946. A gas with a calorific value of 47 Btu/CF was produced using air only, and a 135 Btu/CF gas was produced with oxygen-steam blasts. In the latest work, an electrocarbonization method is used which serves to drive off the coal volatile matter leaving coke underground. British tests which began in 1950 were carried out in a horizontal bed and used the borehole method with a reversible gas stream. The trials have been extended to another seam using high pressure technique. Major problems in underground gasification of coal include reduction of gas leakage through the overburden and prevention of cave-in with consequent obstruction of gas flow. E. J. Pyrcioch

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Calorific Value Control

Gilbert, T. M. and Warner, C. W. STABILIZATION AT THE CITY GATE. *Gas Age*, 115, 38-44 (1955) February 10.

The fundamentals of city gate stabilization of natural gas heating value by air injection are presented. Several typical control schemes are described and illustrated and some of the more important installation factors are examined.

G. G. Wilson

Completion of Wells

Jackson, D. D. TAKE *EXTRA* CARE IN COMPLETING MEDIUM HIGH-PRESSURE WELLS. *Oil Gas J.*, 53, 97-99 (1955) February 14.

The basic danger in completion of gas wells is uncontrolled escape of high-pressure fluids from the formation. A calculation of the effect of pulling drill pipe during completion operation on the control of formation gas is presented, pointing out the major sources of danger. Blowout prevention equipment must be easily and quickly operated and the personnel well trained. Tubing and casing safety rules are outlined. Use of a special packer fluid may reduce the number of washover jobs required.

B. E. Eakin

Compression Equipment

Farnsworth, H. S. FACTORS TO CONSIDER IN DESIGNING A COMPRESSOR STATION. *Gas*, 31, 115-119 (1955) February.

The article discusses the proper design of foundation blocks as the first step toward the subject objective. He offers the point that the shallow, wide block has advantages over the deep, narrow designs because the former produces the minimum lever arm between the centerline of the horizontal forces of the compressor equipment and the center of gravity of the concrete mass. Pulsation is treated by determination of the cause for vibration in compressor station piping, and important design considerations for the elimination of this problem are listed. Also, the evolution of engine cooling-water requirements from the large volume, atmospheric system to the closed system, and some of the features of the latter, are reviewed. Such critical points in compressor station design as cooling water temperature, the starting air system, exhaust system, and safety considerations are detailed.

R. F. Bukacek

Rhea, T. R. GAS TURBINES VS. RECIPROCALS FOR PIPELINE COMPRESSORS. *Oil Gas J.*, 53, 128, 130 (1955) February 21.

By using over-all station fuel efficiencies, per unit of gas pumped, instead of driver efficiencies only, the gas turbine is not at a disadvantage with the conventional engine. Data presented here is for cold weather months when the turbine is most efficient, and the comparison between turbine and piston equipment is very close.

B. E. Eakin

Communications Developments

Keane, C. C. WHAT'S *NEW* IN PIPELINE ELECTRONICS? *Oil Gas J.*, 53, 92-95 (1955) February 7.

The current application of electronics to oil pipelining are reviewed. While some of the applications do not apply to gas lines, many do, for example, transmission of meter readings, for maintenance and leak detection and as an aid in construction.

R. F. Bukacek

Keller, J. E., Humphreys, T. G., and Campbell, C. D. GAS AND PETROLEUM INDUSTRIES ARE DEVELOPING INDUSTRIAL RADIO. *Gas*, 31, 58-62 (1955) February.

The authors develop some of the history behind the rapid increase in the growth of radio communications in the gas and petroleum segments of the nations industrial family. The work of the various committees set up in the oil and utilities industry is described. The scopes and objectives of these committees are clearly defined. Specifically, the participation of The National Committee for Utilities Radio, The Central Committee on Radio Facilities, The National Petroleum Radio Frequency Coordinating Association, The Operational Fixed Microwave Council, and others is adequately covered. The tentative plans being fostered by these groups are presented and some of the studies they are making are described.

Publishers' Abstract

Drilling

Bobo, R. A., Ormsby, G. S., and Hoch, R. S. PHILLIPS TESTS AIR-MUD DRILLING. PART II. *Oil Gas J.*, 53, 104-108 (1955) February 7.

Phillips Petroleum Co. has applied the theory of aerated mud drilling to a field test. The reduced bottomhole pressure resulting from this technique increased the penetration ratio appreciably and alleviated lost circulation problems. The rig configuration and equipment required are discussed, along with operating procedures and a chart for calculating bottom hole pressure for various air circulation ratio. The theoretical equations of the process and calculation procedures are presented. B. E. Eakin

Bono, T. J. COMPRESSED AIR SAVES DRILLING DOLLARS. *Petroleum Eng.*, 27, B44, 46, 48 (1955) March.

In Pennsylvania where gas well spacing is close and offset drainage occurs, speed of drilling is considered a must. In this area air drilling gives faster penetration and longer bit life, and new techniques are resulting in improved operation. B. E. Eakin

Erbe, C. B. IN ARKANSAS' HARD ROCKS EXHAUST GAS BOOSTS DRILLING RATE. *Oil Gas J.*, 53, 119-21 (1955) February 21.

Since natural gas was unavailable, and air was deemed too hazardous, Carter Oil Co. used the engine exhaust gases from the rig and compressor units as a drilling fluid. Bit life increased and the penetration rate was raised compared to mud drilling. The gas required treating to prevent excessive corrosion, and good results were obtained only when the hole was dry. Pictures and flow diagrams of the equipment are included. B. E. Eakin

McGhee, E. DRILL FASTER WITH AIR. *Oil Gas J.*, 53, 74 (1955) February 7.

Experience with air drilling in the Permian basin is reported, its advantages and difficulties are cited. R. F. Bukacek

Exploration

Morrisey, N. BETTER SEISMIC INTERPRETATION NEEDED. *Oil Gas J.*, 53, 72-75 (1955) February 14.

The most important development needed today is a better method of interpreting seismic data. Closer coordination with geologists and a review of old data will result in location of more reserves for the same investment. Better field techniques coupled with more detailed shooting should improve the situation. There was a drop of 20% in the number of seismic crews in the field at the end of 1954 compared to the peak of 710 crews in 1952. B. E. Eakin

Pye, W. D. DISCOVERY PROSPECTS GOOD ON WILLISTON'S EAST FLANK. World Oil, 140, 82, 84, 86, 88, 92 (1955) March.

The chances for developing shallow production along the East flank of the Williston Basin appear to be very good. Oil accumulations are possible in stratigraphic and structural-stratigraphic traps found in this area in a wide variety of combinations. Factors favoring this type of oil accumulation are discussed.

B. E. Eakin

CARDIUM PAY SOUGHT. *Oil Gas J.*, 53, 78 (1955) February 7.

A report on Union Oil Company's attempt to extend production in the Cardium sand in Alberta to a point 32 miles west of earlier producing wells. R. F. Bukacek

Formation Correlation

Jessen, F. W. and Miller, J. C. AN INVESTIGATION OF THE USE OF THE SPECTROGRAPH FOR CORRELATION IN LIMESTONE ROCK. *J. Petrol. Techn.*, 7, 41-44 (1955) February.

The geologic correlation of limestone cores from wells located in two separate Canyon reef fields of West Texas has been possible by means of metals contents determined by spectrographic analysis, and the method should prove to be applicable to any type geologic formation. Rapid analysis by utilizing available analytical equipment of improved design should prove of tremendous advantage in the routine logging of wells and also in further research. The value of this method of analysis in studying various phases of sedimentation is suggested.

B. E. Eakin

Mangold, G. B. DTA—A NEW TYPE OF FORMATION CORRELATION. *World Oil*,

140, 77-80 (1955) February 1.

Differential thermal analysis provides a relatively inexpensive and rapid method of accurately correlating formation zones from well to well. The method is based on thermal reaction temperature characteristics of the various different materials; shales, sands, quartz, etc. Each material exhibits a characteristic reaction curve when compared to alumina at a constant rate of heating. A comprehensive handbook of standard mineral thermal curves is being compiled, which will result in increasing the usefulness of this newest correlative technique.

B. E. Eakin

Fracturing

Heck, E. T. FRACTURES AND JOINTS. *Producers Monthly*, 19, 20-23 (1955) February.

The effect of hydraulic fracturing depends on the existence of points or planes of weakness in rocks. A general description of the type of joints, or fractures, commonly encountered in rock is presented. Photographs illustrate the various types.

B. E. Eakin

Gas Cleaning

Hazlett, R. H. and Almquist, W. E. IF DUST IS POLISHING AWAY DOLLARS. *Gas Age*, 115, 44, 45 (1955) February 24.

The effects of pipeline dust on equipment and some of the problems in dust removal are discussed.

R. F. Bukacek

Krieble, E. L. (assigned to Selas Corp.) GAS CLEANER. U.S. 2,701,624 (1955) February 8.

This apparatus claims the continuous removal of dirt, oil, water, oil vapor and solid particles from compressed air and gases. The apparatus contains both a filtering and an adsorption element, and has application to instrument-air cleaning for example.

R. F. Bukacek

FILTER UNIT SCREENS MINUTE PARTICLES FROM NATURAL GAS. *Gas*, 31, 120-121 (1955) February.

A description of a filter unit employing fiber glass matting is presented. Constructed by Lone Star Gas Co., these filters have been applied to a variety of problems involving liquid and solid dispersions.

R. F. Bukacek

Gas Lift

Kirkpatrick, C. V. FUNDAMENTALS OF GAS LIFT: 10 GAS-LIFT-VALVE SPREAD: HOW TO FIND IT. *Oil Gas J.*, 53, 113-14 (1955) February 28.

The spread of a gas lift valve is the difference between the well-head pressure at which it opens and that at which it closes. The spread affects injection gas:oil ratio, and also determines spacing in the well. A chart is presented for determining which valve in a gas-lift well is operating, and an example is worked.

B. E. Eakin

"Hot" Insertion of Valves

INSERTING A GAS VALVE IN AN EXISTING LINE UNDER PRESSURE. *Gas*, 31, 57 (1955) February.

A brief description of equipment and method used to install a gas valve in an existing line under pressure. Article states that valve sizes from 4"-20" can be inserted in a vertical position and from 24"-48" in a horizontal position against pressures up to 100 psig.

G. G. Wilson

"Hot" Tapping

McBrien, J. H. HOT TAPPING COMES OF AGE. *Pipe Line Ind.*, 53, 48-52 (1955) February.

A description of hot tapping techniques, equipment and fittings is presented with equipment drawings.

R. F. Bukacek

Hydrate Inhibitor

Jacoby, R. H. CALCULATION OF METHANOL REQUIREMENTS TO PREVENT FORMATION OF GAS HYDRATES. *Gas* 31, 112-114 (1955) February.

Methanol injection for the inhibition of hydrate formation is economically interesting under conditions of low-throughput, or where temporary or infrequent protection is required. This article provides information to permit determination of the methanol requirements.

R. F. Bukacek

Induction Logging

Martin, R. I. HOW INDUCTION LOGS WORK. *Oil Gas J.*, 53, 130 (1955) February 28.

The use and theory of the method of induction

logging of wells is outlined. A comparison of the self-potential, resistivity and induction logs for a well given. B. E. Eakin

Interior Coatings for Lines

NEW DEVELOPMENTS PROMISE TO MAKE PROTECTION CHEAPER, MORE EFFECTIVE. 1. INTERNAL COATING AT PIPE MILLS WITH EPOXY RESIN . . . *Pipe Line Ind.*, 2, 40-1 (1955) March.

Brief outline of the possibilities of epoxy resins as interior coatings for pipe lines.

G. G. Wilson

Line Blowdown

Shebeko, B. C. BLOWDOWN CHART. *Gas* 31, 109-111, (1955) February.

The proper sizing of blowdown valves is very important to prevent the delay that will result if these valves are undersized and the waste that is experienced when a valve is oversized. From his investigation and experimentation, the author has produced a chart from which the blow-down time for pipe lines through 40%-area plug valves can be readily determined. Examples of the use of the chart are given.

R. F. Bukacek

LP-Gas Storage

Dougherty, P. F. HOW SUN CREATED UNDERGROUND STORAGE. *Oil Gas J.*, 53, 109-12 (1955) February 28.

Three salt caverns have been washed in the salt beds underlying the Sarnia, Ontario refinery with present storage capacity for LP-Gas products exceeding 150,000 bbls. Ultimate capacity is expected to be 500,000 bbl. This report deals specifically with selection of the salt bed, spacing pattern, drilling and casing program, washing program, leakage testing of tubing, cavern strapping, and brine pit operation.

B. E. Eakin

Kroeger, C. V. A PEAK SHAVING AID: CAVERN STORAGE FOR LP-GAS. *Gas Age*, 114, 26-30, 68, 69 (1955) February 10.

The underground storage of LP-gas in caverns has been successfully used in bulk applications, and offers a potential method for local storage of LP-gas by peak shaving plants. The economic and geological factors influencing choice of cavern type storage are discussed.

B. E. Eakin

PROPANE CAN BE STORED IN PRESTRESSED CONCRETE PIPE. *Butane-Propane News*, 17, 35, 36, 38 (1955) February.

Prestressed concrete pipe has been successfully adapted to LP-Gas storage. In initial tests five 16-ft sections of 48-in prestressed reinforced concrete pipe with a water capacity of 7760 gal have been used to store both butane-propane and propane. The pipe is joined by a neoprene gasket between sections which compensates for slight misalignment. Several schemes have been proposed for using circular storage rings in this manner. The costs are approximately 25% less than for above-ground steel storage.

W. G. Bair

Measurement Technique

Cottrell, J. L. GAS MEASUREMENT AND INTEGRATION CLINIC. *Gas*, 31, 124, 127, (1955) February.

The author diagnoses some of the common complaints associated with the subject. Such problems as failure to place the proper notations on charts, pitted orifice plates, non-standard orifices, improper placement of sampling connections and other obstructions, accumulated dirt in meter runs, effect on accuracy exerted by the installation of pulsation elimination equipment or devices, effects of oxidized mercury, effects of stuffing-box leakage, and other relative problems are discussed in detail, and recommendations for the elimination or amelioration of them are made. Publishers' Abstract

Network Analysis

Escolas, E. J. and Woodward, H. B. COLUMBIA GAS SOLVES A DISTRIBUTION PROBLEM WITH A NETWORK ANALYZER. *Gas*, 31, 45-50 (1955) February.

The use of a McIlroy network analyzer to solve a low pressure gas distribution network problem is described. Improvements were indicated which permitted delivery capacity to be increased and a large space heating load to be added. Network studied included 6 district regulators, 224 pipe sections, and 152 loads. Four solutions are illustrated with diagrams.

G. G. Wilson

Permeability

Nielsen, R. F. SHORT CUTS FOR FINDING RELATIVE PERMEABILITIES. *Oil Gas J.*, 53, 129 (1955) February 28.

The method of calculating relative permeabilities from capillary pressure curves as suggested by Burdine is illustrated. A simplification of this technique, proposed by Corey, is also presented. B. E. Eakin

Piping Forces

Abraham, E. D. and McClure, G. M. HOW STRESSES AFFECT BRANCH CONNECTION. *Petroleum Refiner*, 34, 117-20 (1955) February.

A report on Battelle Institute's work on unreinforced pipeline branch connections. A description is given of the field and laboratory work and of some of the results obtained. Further work on this problem is discussed. R. F. Bukacek

Ketchum, E. R. CALCULATING FORCES DUE TO A "SNAKE" OF PIPING. *Heating, Piping and Air Cond.*, 27, 108-110 (1955) February.

An analysis of the forces acting on a long pipeline lying on the ground unrestrained except at the ends. R. F. Bukacek

Piping Standards

Amer. Soc. Mech. Eng. GAS TRANSMISSION AND DISTRIBUTION PIPING SYSTEMS. ASA B31. 1.8-1955, 2nd Ed., 101+vi pages; $2.50; ASME, New York.

Section 8 of the American Standard Code for pressure piping covers the design, fabrication, installation, inspection, testing and safety aspects of operation and maintenance of gas transmission and distribution systems. This code is not intended to apply retroactively to existing installations insofar as design, fabrication, installation, established operating pressure and testing are concerned, but is intended to apply to the operation, maintenance and uprating of existing installation. R. F. Bukacek

Hough, F. A. THE NEW GAS TRANSMISSION AND DISTRIBUTION PIPING CODE. MATERIALS AND EQUIPMENT: CHAPTER 1 OF THE CODE. *Gas*, 31, 69, 72 (1955) February.

Part 2 of a series discussing the revised Section 8 of Standard ASA B31.1, Gas Transmission and Distribution Piping Systems. Standard specifications in general are discussed and some of their weaknesses are illustrated. Limitations of code are pointed out. G. G. Wilson

Pipe Line Dust

Bissey, L. T. and Villarreal, J. F. NATURAL GAS PIPELINE DEPOSITS. Penn State Univ. Min. Ind. Expt. Sta. Bulletin No. 63 (1955).

A report of investigations on pipeline dusts obtained from members of the Pennsylvania Natural Gas Men's Association. A variety of physical and chemical analyses were made to identify and determine the sources of the dusts. Internal corrosion, mill scale, construction dirt, and formation or well material were found to be the sources of pipeline dusts. The analyses made are reported as well as considerable discussion. R. F. Bukacek

Pipe Handling

Ebdon, J. PIPE YARD DESIGN. *Gas*, 31, 51-54 (1955) February.

The author develops some of the basic design concepts to be considered by gas transmission and distribution companies when planning an efficient pipe handling and storage facility. Ideal location, layout, and facilities are covered. The need for flexibility is emphasized. Pipe handling equipment is reviewed and recommendations made. The question of company-owned vs. contracted pipecoating and wrapping facilities is discussed. Publishers' Abstract

Plastic Pipe Services

Bogumill, T. R. A UTILITY ACCEPTS PLASTIC PIPE FOR SERVICE RENEWALS. *Gas Age*, 115, 34, 35, 71, 72 (1955) February 10.

This article is divided into two parts: Why and How. The first part recounts with the circumstances leading to the investigation of and acceptance of plastic pipe for low pressure service replacements by Peoples Gas Light and Coke Co. of Chicago. The second part briefly

describes the method used to insert Tenite II plastic pipe through 1½" steel low-pressure services in order to accomplish renewal.

G. G. Wilson

Pressure Control

McCray, G. W. PRECAUTIONS TO PREVENT BLOWOUTS. *Oil Gas J.*, 53, 100-102 (1955) February 14.

The preventive measures required to control formation fluid pressures are well established and standard. The hazard is in the failure to use the knowledge and equipment that can stop blowouts. This article briefly describes the equipment and procedures. B. E. Eakin

Producing Structure

Ryman, L. J. SOUTHWEST MULDOON BELIEVED NOW FULLY DEVELOPED. *Oil Gas J.*, 53, 100-103 (1955) February 7.

This Texas coastal field, typical of a duster of small, shallow oil fields which produce from a series of fault closures, is now believed to be fully developed. The Steinhauser sand has provided the major portion of the fields production. There are 24 producing wells, and a composite log of subsurface formations encountered is given. The wells are on a 20 acre spacing.

B. E. Eakin

Pressure Maintenance

GIANT PRESSURE MAINTENANCE PROJECT BEGUN IN VENEZUELA. *World Oil*, 140, 166, 168, 172, 173 (1955) February 1.

The new $20 million compressor plant located on a concrete platform 7 miles off shore in Lake Maracaibo is the largest pressure maintenance project outside the U.S. It is designed to inject 137 MMCF daily, and as a direct result of operating the new plant the following benefits are expected: 1) continued production by natural flow, 2) conservation of a large volume of gas, 3) increased production rates by about 50 percent; 4) an increase of about ⅛ in total amount of oil recovered from the reservoir. There are ten 6000 hp. gas turbines driving specially designed centrifugal compressors. The gas is compressed in 7 stages from a plant pressure of 25 psig to an injection pressure of 1935 psig. B. E. Eakin

Vent Line Design

Parish, C. E. and Cornell, D. NEW DESIGN METHOD FOR VENT LINES. *Petroleum Refiner*, 34, 121-23 (1955) February.

The design method for vent lines using a Mollier diagram for the gas in question is presented with example problems. The calculations are more involved than those using ideal gas laws but the results are more reliable.

R. F. Bukacek

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Distillation Control

Mason, P. W. ALL-ELECTRIC CONTROL OF CRUDE-DISTILLATION UNITS. *Oil Gas J.*, 53, 108-09, 112, 114 (1955) January 3.

The first of the new 60,000 bbl. per stream day twin units at Anglo-Iranian Oil Co.'s Aden refinery is completely controlled from a central control room of unconventional design. The graphic panel is mounted at a 30° angle to the horizontal for easy reading and has engraved process flow lines showing all necessary flow, level, temperatures, and pressure points in the correct location and functional sequence. Miniature indicating controllers are used extensively. Six multi-point temperature recorders keep continuous records of the most important points. All units are mounted for quick access and easy maintenance. B. E. Eakin

Flooding Performance

Botset, H. G. SECONDARY RECOVERY WATER FLOODING. *Producers Monthly*, 19, 24-43 (1955) February.

The fundamental principles of water flooding are discussed. The inherent factors common to all reservoirs are outlined and their effect on recovery presented. Topics covered include: porosity, permeability and relative permeability, grain surface characteristics including wettability, predicting water flood operations from field and laboratory data, saturation distribution during water injection, formation fracturing, flood pattern, field tests with wetting agent, heating of injection wells, and the use of CO_2 in secondary recovery, the effect of

gas injection, and methods of controlling water soil ratios. The article is an excellent introduction to the mechanics of reservoir secondary recovery method. B. E. Eakin

Crawford, P. B. HORIZONTAL FRACTURES IN THIN RESERVOIRS. PART 7: CONDUCTIVITY OF FIVE-SPOT PATTERN. *World Oil*, 140, 182, 185 (1955) March.

The effect of pancake-type fractures in the reservoirs on water-flooding and gas cycling is outlined. The results of laboratory investigations on reservoir analogs is given. The conclusions indicate that it may be possible to profitably flood or cycle thinner pays after horizontally fracturing than has been possible heretofore. B. E. Eakin

Horner, W. L. PROPER RESERVOIR EVALUATION PAYS DIVIDENDS . . . IN SUCCESSFUL SECONDARY RECOVERY. *Oil Gas J.*, 53, 81-83 (1955) January 10.

Recent advances in the interpretation of reservoir fluid and core data indicate that many reservoirs formerly considered unsuitable for water flooding may be profitably produced by this secondary recovery method. A checklist for evaluation of reservoir characteristics is presented. B. E. Eakin

Gulf Sedimentary Structures

Shepard, F. P. STRATIGRAPHIC RESEARCH THAT MAY PAY OFF. *Oil Gas J.*, 53, 184-85, 187-89 (1955) February 21.

Oceanographic studies of the Gulf area indicate the present sediment deposition follows down to considerable depth, possibly to the Pleistocene period. In this manner thick sand deposits developed under what are now the barrier islands and there sand lenses have become flanked by fine-grained materials which may indicate stratigraphic trapping of petroleum in this area. A report on A.P.I. Project 51 involving a study of present sedimentation conditions. B. E. Eakin

Petroleum Coke

Bradley, J. M. (assigned to Godfrey L. Cabot, Inc.) MANUFACTURE OF COKE FROM LIQUID HYDROCARBONS. U. S. 2,697,069 (1954) December 14.

This process for continuous manufacture of petroleum coke calls for the continuous depositing of a thick coating of liquid hydrocarbon on an internally-heated moving drum, heating of the coated surface in an inert gas atmosphere, and scraping the product coke from the drum with a knife. E. B. Shultz

Shale Oil Production

Dalin, D. (assigned to A/B Svenska Maskinverken, Sweden) METHOD AND APPARATUS FOR THE DESTRUCTIVE DISTILLATION OF OIL SHALE. U. S. 2,698,283 (1954) December 28.

In this process, crushed shale would move downward in succession through a preliminary heating zone, a preheating zone, a distillation zone and a combustion zone. Air heated by indirect exchange with flue gases from the combustion zone would be used for shale preheating. The relative pressures of air in the preheat zones, and distillation gases in the distillation zone would be regulated to prevent their mixing together. E. B. Shultz

Gilbert, G. R. (assigned to Standard Oil Development Co.) FLUIDIZED DISTILLATION OF OIL SHALE BY DIRECT HEATING WITH A HEATED LIQUID SPRAY. U. S. 2,700,018 (1955) January 18.

The patent describes an improved method of fluidized distillation of oil shale in which molten lead at a temperature of about 900°-1050° F. is introduced at the top of the distillation zone as a liquid heating medium which passes downwards as a falling spray, evenly distributed over the cross-sectional area of the distillation zone, and forms a liquid seal at the bottom preventing escape of vapours. The shale feed is maintained as a dense fluidized mass in direct contact with the falling spray of molten lead, which ensures transfer of substantially all the heat required for the shale distillation as sensible heat of the heating medium. K. C. Channabasappa

Johnson, A. J., Liedholm, G. E., and Lowman, M. C. (assigned to Shell Development Co.) METHOD AND APPARATUS FOR THE PRODUCTION OF SHALE OIL FROM OIL SHALE. U. S. 2,694,037 (1954) November 9.

A process is described by which crushed oil

shales are preheated by hot end-products and are retorted with countercurrent flow of hot gases produced by oxidative cracking of a portion of the recovered oil. E. B. Shultz

Texas Oil Geology

Gardner, F. J. TEXAS OIL FLOWS FROM ROCKS OF EVERY GEOLOGICAL AGE. *Oil Gas J.*, 53, 107-14 (1955) February 21.

Texas oil is produced from rocks of every period from Cambrian through Quaternary. It is estimated that 97.7 billion barrels of crude oil had been discovered in the state prior to 1955. Of this 17.8 billion has been produced but the expected recovery by known production techniques will recover only about ⅓ of the remaining oil. A description of various well known formations from each of the different epochs is given, with photographs of many representation cores. B. E. Eakin

7. ANALYTICAL METHODS AND TESTS

Coal Moisture

Gray, V. R. and Whelan, P. F. QUICK MOISTURE METHOD FOR COAL. *Chem. and Ind.* (Brit.) No. 6, 126-28 (1955) February 5.

The maximum temperature rise is measured when concentrated sulfuric acid is added to the ground coal sample in a Dewar flask. The method gives an accuracy of about 5% between 15 and 40% moisture content and takes 5 minutes or less per determination. D. J. Dennison

Extraction Tests of Crudes

Black, J. F., and Smith, C. D. (assigned to Standard Oil Development Co.) CORRELATION OF CRUDE OILS. U. S. 2,700,593 (1955) January 25.

This invention relates to an improved method for determining similarities, or dissimilarities, between crude oils and thus to characterize them, or correlate them with respect to geologic source. In accordance with this invention, crude oil samples are treated with a series of solvents so as to segregate certain fractions which may then be subjected to infrared analysis, spectrochemical tests, or x-ray diffraction tests to characterize uniquely the crude oil samples from which the fractions were segregated. Such characterization of selected fractions has been found to yield results which are reproducible and free of the influence of variations in sediment content or light ends content. D. M. Mason

Gas Chromatography

Patton, H. W., Lewis, J. S., and Kaye, W. I. SEPARATION AND ANALYSIS OF GASES AND VOLATILE LIQUIDS BY GAS CHROMATOGRAPHY. *Anal. Chem.*, 27, 170-174 (1955) February.

Gas chromatographic techniques were used to study the potentialities of selective adsorption and partition methods for the separation and analysis of gases and volatile liquids. Methods involving elution by hydrogen, nitrogen, or carbon dioxide from columns containing charcoal, silica gel, or alumina provided excellent separation of hydrocarbons and other non-polar materials. Gas chromatographic elution is simple, accurate, and very effective for the identification and determination of the components of many gaseous and liquid mixtures, particularly of hydrocarbons. Authors' Abstract

H_2S-SO_2 Mixtures

Smith, B. QUANTITATIVE ANALYSIS OF MIXTURES OF HYDROGEN SULFIDE AND SULFUR DIOXIDE. Chalmers Univ. (Sweden) Trans., No. 150 (1954).

The Lunge iodine method and the Winkler method for determination of H_2S and SO_2 when simultaneously present were investigated. The Winkler method was found to be more reliable and was improved to yield a reasonably accurate, simultaneous determination of H_2S and SO_2 in gaseous mixtures. D. M. Mason

Moisture in Propane

Gentry, R. M. and Gunther, V. H. COBALT BROMIDE TEST-1 WATER SOLUBILITY IN LIQUID PROPANE. *Oil Gas J.*, 53, 131-32 (1955) February 28.

The effect of temperature, volume, and propylene content on the sensitivity of the N.G.A.A. cobalt bromide moisture test for propane is discussed. Charts giving the equilibrium vaporization ratio, and water content, versus temperature are included. B. E. Eakin

Nitrogen Oxides

Schrenk, H. H. CONTROVERSIAL TOXICITY OF OXIDES OF NITROGEN CONTINUES TO RECEIVE ATTENTION—HYDROGEN PEROXIDE TOXICITY REPORTED. *Ind. Eng. Chem.*, 47, 93A-94 (1955) February.

Controversial toxicity of oxides of nitrogen is discussed with relation to recent data. Data on toxicity of hydrogen peroxide is reported.

D. M. Mason

Odorant Comparison

Nevers, A. D. HOW ODORANTS ARE EVALUATED BY USE OF NEW APPARATUS. *Amer. Gas J.*, 182, 2-23 (1955) February.

Pictures and a diagram of the Sharples Odor Comparator are presented and its practical operation is described. Qualitative results are obtained with the aid of at least a 6-man panel of "sniffers". The theory of the odorant intensity-concentration relationship, and the difficulties of describing odor intensities quantitatively are discussed. G. G. Wilson

Oxygen Determination

Pepkowitz, L. P. CONTINUOUS DETECTION AND MEASUREMENT OF LOW CONCENTRATIONS OF OXYGEN IN GASES. *Anal. Chem.*, 27, 245-248 (1955) February.

The continuous detection and measurement of low concentrations of oxygen in gases is of paramount importance in liquid metal heat transfer technology. This paper describes an instrument based on the dew point principle for such continuous detection and measurement. A sensitivity of at least 0.0005 volume % of oxygen is attained with a mean deviation for precision of ± 0.0001 volume %. The instrument is applicable to the determination of oxygen in the common gases such as nitrogen, helium, the other rare gases, hydrogen, and carbon dioxide. Author's Abstract

Petroleum Ash

Childs, E. B. and Kanehann, J. A. APPLICATION OF THE LOGARITHMIC SECTOR TO QUANTITATIVE SPECTROGRAPHIC ANALYSIS OF PETROLEUM ASH RESIDUES. *Anal. Chem.*, 27, 222-25 (1955) February.

A logarithmic sector disk placed immediately before the slit of a stigmatic spectrograph forms tapered lines, the length of which are indicative of the intensity of the light reaching the photographic plate. A special eye piece is used to read the length of line. Ashing is used to prepare the sample. The standard deviation of the mean for all samples from the chemical results, which were taken as the true values, was 30%. Eleven elements; aluminum, magnesium, lead, tin, silicon, iron, chromium, barium, calcium, copper, and silver, were determined with indium as the internal standard.

R. R. Amrine

Shale Oil Composition

Dinneen, G. U., Smith, J. R., Van Meter, R. A., Allbright, C. S., and Anthoney, W. R. APPLICATION OF SEPARATION TECHNIQUES TO A HIGH-BOILING SHALE-OIL DISTILLATE. *Anal. Chem.*, 27, 185-190 (1955) February.

Modern separation techniques have been used to resolve a gas oil from Colorado shale oil into simpler fractions to facilitate studies of composition. The gas oil was a complex material containing about equal quantities of hydrocarbon and nonhydrocarbon compounds. Adsorption techniques were the principal tools used, supplemented by vacuum distillation, thermal diffusion, and adduct formation. These techniques were selected to provide maximum resolution and recovery of material and to minimize decomposition. The gas oil was separated into nitrogen, aromatic, olefinic, and saturated concentrates. These were further separated into simpler fractions. Information presented in this paper should be applicable to composition studies in other fields. Authors' Abstract

Size Consist

Bostock, W. (assigned to Simon-Carves Ltd.) APPARATUS FOR DETERMINING PARTICLE SIZE DISTRIBUTION. U. S. 2,699,673 (1955) January 18.

An apparatus capable of separating and obtaining particle size distribution for fine particles is described. The sample is first dispersed in a liquid medium and then allowed to settle on a torsion balance. The latter allows one to obtain the weights of the particle which settle.

S. Mori

Sulfur in Petroleum

Granatelli, L. OXYHYDROGEN BURNER FOR DETERMINATION OF SULFUR IN DRIP OILS. *Anal. Chem.*, 27, 266-69 (1955) February.

Difficulties encountered with conventional equipment in obtaining complete combustion of aromatic drip oils and of petroleum liquids containing elemental sulfur have been circumvented by aspirating the sample into the flame of the oxyhydrogen burner of the Beckman flame photometer. A rapid burning rate of about 24 ml. per hour can be maintained. Analysis of samples containing from 0.006 to 0.112% sulfur showed standard deviations of 0.001 to 0.004%.
D. M. Mason

Quiram, E. R. DETERMINATION OF SULFUR IN VOLATILE HYDROCARBON MIXTURES BY A LAMP-CONDUCTOMETRIC METHOD. *Anal. Chem.*, 27, 274-277 (1955) February.

A conductometric method has been developed for the determination of sulfur in the products of combustion resulting from lamp burning of volatile hydrocarbon mixtures. It is simpler than conventional procedures, and has eliminated many of the weaknesses encountered with turbidimetric, nephelometric, volumetric, and gravimetric methods. A new type of absorber has been designed which permits the determination to be completed in one vessel. Means are provided for eliminating errors caused by temperature fluctuations and dissolved carbon dioxide. The method has been found suitable for all ranges of sulfur concentration. The presence of aldehydes, halogens, nitrogen, and other acid-forming substances will interfere. Author's Abstract

Thompson, C. J., Coleman, H. J., Rall, H. T., and Smith, H. M. SEPARATION OF SULFUR COMPOUNDS FROM PETROLEUM. *Anal. Chem.*, 27, 175-185 (1955) February.

This paper reviews work on the newer methods of separation of sulfur compounds in petroleum, particularly as applied by American Petroleum Institute Research Project 48A. Included are the physical methods of distillation, adsorption, and thermal diffusion; and chemical methods, which include adduct and complex formation. Thermal diffusion, one of the more recently applied techniques, is stressed and its application to the separation of sulfur compounds and the constituents of crude oil is discussed. A list of 43 sulfur compounds (40 definite, 3 tentative) found in Wasson, Tex., crude oil is given. These were concentrated from the crude oil by one or more of the above methods and their semiquantitative identification was established by infrared absorption spectra or mass spectrometry. Sulfur compound types throughout the complete boiling range of a crude oil, as developed by adsorption and mass spectral data, are given.
Authors' Abstract

8. GENERAL AND PHYSICAL CHEMISTRY

Activity Coefficients

Edmister, W. C. and Ruby, C. L. GENERALIZED ACTIVITY COEFFICIENTS OF HYDROCARBON MIXTURE COMPONENTS. *Chem. Eng. Progress*, 51, 95F-101F (1955) February.

The data from some 276 charts was reduced to six charts giving vapor and liquid activity coefficients as functions of reduced temperature, reduced pressure and boiling point ratio and a correlation was developed that can be used to estimate values for other obtaining equilibrium vapor-liquid distribution ratios or preparing K-value plots for individual hydrocarbons. The use of boiling points as a parameter is considered as taking into account the effects of molecule size. These generalized correlations can also be applied to the deviation of partial thermodynamic properties such as enthalpy and volume.
R. T. Ellington

Distribution Constants

Taft, R. W., Jr., Purlee, E. L. and Riesz, P. A METHOD FOR DETERMINING THE DISTRIBUTION CONSTANT FOR A SUBSTANCE BETWEEN THE GAS PHASE AND A CONDENSED PHASE. *J. Amer. Chem. Soc.*, 77, 899-902 (1955) February 20.

A saturation method for determining distribution constant was employed in which the pressure drop on solution of the vapor in a constant volume system is measured. A precision of

about 1% was obtained. Distribution constants are reported for carbon dioxide, methane, ethylene, isobutene, trimethylethylene, and methyl chloride in water trimethylethylene in aqueous nitric, perchloric, and sulfuric acid, and isobutene in aqueous nitric acid, at temperature from 0° to 30° C. D. M. Mason

Methane-Nitrogen Mixtures

Bloomer, O. T., Eakin, B. E., Ellington, R. T. and Gami, D. C. THERMODYNAMIC PROPERTIES OF METHANE-NITROGEN MIXTURES. Institute of Gas Technology (Chicago) Research Bulletin 21 (1955) February. ($3.50)

This Bulletin presents data on the thermodynamic properties of methane-nitrogen mixtures, required for computing the energy requirements of processes to separate nitrogen from natural gas by liquefaction and distillation, for calculating compressor and expansion turbine energy requirements, for determination of heat exchange loads, for calculating throttling temperature drops, and for other uses. Examples of use of the data in these calculations are given. Two mixtures of methane and nitrogen, one containing 10% and the other 30% nitrogen, were selected for demonstration. The enthalpies, entropies and compressibility factors of the mixtures are presented in tabular form and as charts of enthalpy versus entropy, entropy versus temperature, and compressibility factor versus pressure. The range of these charts and tables for the vapor phase is from saturation at —284°F to superheated vapor at 200° F and pressures from 10 to 1500 psia, and, for the liquid phase, from saturation at —258°F and 100 psia to the critical point. For the superheated vapor region the properties of the two mixtures were calculated by use of the zero-pressure heat capacity data and an equation of state for methane-nitrogen mixtures. For the two-phase liquid-vapor region, calculations were based on experimental pressure-volume-temperature data obtained at the Institute of Gas Technology for mixtures of methane and nitrogen. Constant-pressure enthalpy versus composition charts are also presented for pressures of 100, 200 and 300 psia. These charts were constructed with data on mixtures containing 10, 30 and 70 percent nitrogen, and published data on the thermodynamic properties of pure methane and pure nitrogen. The use of these data for calculation of the conditions in, and heat requirements for, selected separation cycles employing distillation is illustrated. Comparative energy requirements, based on attainable compressor and expansion turbine efficiencies, for five cycles with varied operating conditions, are tabulated. The power and cooling water requirements for one separation cycle in a plant processing 100 MMCF per day are presented. Authors' Abstract

Nickel Carbonyl

Spice, J. E., Staveley, L. A. and Harrow, G. A. THE HEAT CAPACITY OF NICKEL CARBONYL AND THE THERMODYNAMICS OF ITS FORMATION FROM NICKEL AND CARBON MONOXIDE. *J. Chem. Soc.* (British), 100-04 (1955) January.

Experimentally determined thermal properties of nickel carbonyl are presented. Melting point of the pure compound is reported as 253.86° K correct to ± 0.05° K and the mean value for the heat of fusion as 3306 ± 2.5 cal./mole. Heat capacity data are given for temperatures between 90° and 270° K at 5° temperature intervals. Thermodynamics of the reaction Ni + 4 CO ⇄ Ni (CO_4) (g) is discussed as regards equilibrium constant, heat of reaction, entropy and free energy. E. J. Pyrcioch

Phase Equilibria

Akers, W. W., Burns, J. F., and Fairchild, W. R. LOW TEMPERATURE PHASE EQUILIBRIA: METHANE-PROPANE SYSTEM. *Ind. Eng. Chem.*, 46, 2531-34;

Akers, W. W., Kelley, R. E., and Lipscomb, T. G. CARBON DIOXIDE-PROPANE SYSTEM. *Ind. Eng. Chem.*, 46, 2535-39 (1954) December.

Phase equilibria data for the methane-propane system is presented in the form of K values and as a dew-bubble point curve. The experiments were performed using a circulating vapor system. Also presented is the vapor-liquid equilibria data for the propane-carbon dioxide system obtained on the same apparatus. B. E. Eakin

Williams, R. B. and Katz, D. L. VAPOR LIQUID EQUILIBRIA IN BINARY SYSTEMS.

Ind. Eng. Chem., 46, 2512-20 (1954) December.

This article reports phase equilibria data obtained for four binary systems of hydrogen with ethylene, ethane, propylene, and propane. Three ternary mixtures were also studied at —100° F. and two pressures. A recirculating type equilibrium cell was used. The range investigated is from —300 to +100° F. and 100 to 10,000 psia. Data is given in the form of equilibrium constants charts for each system. B. E. Eakin

Volumetric Behavior

Akers, W. W., Kehn, D. M., and Kilgore, C. H. VOLUMETRIC AND PHASE BEHAVIOR OF NITROGEN-HYDROCARBON SYSTEMS. NITROGEN-n-HEPTANE SYSTEM. *Ind. Eng. Chem.*, 46, 2536-39;

Akers, W. W., Attwell, L. L., and Robinson, J. A. NITROGEN-BUTANE SYSTEM. *Ind. Eng. Chem.*, 46, 2539-40 (1954) December.

The volumetric and phase behavior of the nitrogen-n-heptane and nitrogen-butane systems are presented. The data is plotted as equilibrium constants for the pressure range of 0 to 10,000 psia, and temperatures from 90 to 360° F. B. E. Eakin

Stewart, D. E., Sage, B. H. and Lacey, W. N. VOLUMETRIC BEHAVIOR OF n-HEXANE IN LIQUID PHASE. *Ind. Eng. Chem.*, 46, 2529-31 (1954) December.

The density of liquid n-hexane at pressures to 10,000 psia and in the temperature interval 100° to 460° F. are reported. The experimental investigation was performed using a stainless steel PVT cell. Tables of densities and molal volumes for the liquid are given. B. E. Eakin

9. ORGANIC CHEMISTRY

Acetylene Manufacture

Bills, J. L. (assigned to Union Oil Co. of California) ACETYLENE MANUFACTURE. U. S. 2,698,349 (1954) December 28.

Improved yields of acetylene are obtained by adding preheated hydrogen to a reaction mixture of methane and oxygen, this addition to occur with non-turbulent mixing sometime after the initiation of the methane-oxygen reaction. Temperatures of 1100° to 1500° C., residence times of 0.005 and 0.02 second and ratios of 0.5 to 5 moles hydrogen per mole methane are specified. O. P. Brysch

Alcohol Process

Nagel, R. H. (assigned to Standard Oil Development Co.) ALCOHOL SYNTHESIS PROCESS. U. S. 2,697,731 (1954) December 21.

Improved yields of alcohols are obtained from a carbonylation process ("Oxo" process) when the still bottoms from the alcohol distillation step are recycled and blended with the aldehyde feed to the hydrogenation zone (5% to 50% of feed). Sulfactive hydrogenation catalysts may be used, with addition of 1 to 10% water to the feed. O. P. Brysch

Ammonia Synthesis Costs

Duff, B. S. ECONOMICS OF AMMONIA MANUFACTURE FROM SEVERAL RAW MATERIALS. *Chem. Eng. Progress*, 51, J12-16 (1955) January.

Comparative schemes for production of ammonia from natural gas, fuel oil, coal, coke oven gas and waste catalytic reformer gas are presented. Capital costs and manufacturing costs based on equal thermal price for each of the raw materials are given. On this basis, both capital investment and production costs per ton of ammonia are highest for partial oxidation of coal and lowest for catalytic reformer gas. The data given is in a form which can be easily adjusted to reflect the influence of local conditions for comparative purposes. J. M. Reid

Rubber Plants Sold

FINALLY SOLD: 24 RUBBER PLANTS. *Chem. Eng. News*, 33, 1439 (1955) April 4.

By rejecting the disapproval resolutions in both House and Senate, Congress has ended the Government's synthetic rubber monopoly, and the Rubber Producing Facilities Disposal Committee may proceed with the sale of 24 rubber plants, raw materials stocks, parts and rubber inventories for $310 million. Provisions are included for needs of small business and for national security. The 23 cents per lb price maintained by the Government may change in the face of demand and supply. Consumption of rubber in the U.S. of 2.5 million long tons, and in the free world of 5 million tons must be met 50 percent by synthetic rubber.

O. P. Brysch

10. CHEMICAL ENGINEERING

CO_2 Absorption

Rumford, F., Edwards, G., Robertson, R. and Thomson, I. THE ABSORPTION OF CARBON DIOXIDE BY ALKALINE SOLUTIONS. *Inst. Chem. Eng. Trans.* (British), 32 No. 3, 181-191.

Experimental studies were made on the absorption of carbon dioxide in an ammonia solution based on the theory that a rate controlling soluble complex is formed between the ammonia gas and carbon dioxide. In one type of absorber where carbon dioxide and ammonia gas were mixed and treated with a water spray it was found that absorption of carbon dioxide is not increased by the use of gaseous ammonia and a water spray, rather than ammonia in solution. Also, a freshly formed spray was found to be more effective than a spray in its later stages. In the other type of absorber an attempt was made to continually break down liquid surfaces by mechanical means and to absorb carbon dioxide in an ammoniac solution. This centrifugal washer was found to give mass transfer rates of 60 lb moles/cu ft/hr and the absorption rate varied directly with the liquid flow rate according to the equation. Na (lb moles absorbed/hr) = 0.117 G_L (gal/hr) + 0.303.
E. J. Pyrcioch

Extraction Columns

Keith, F. W., Jr., and Hixson, A. N. LIQUID-LIQUID EXTRACTION SPRAY COLUMNS. *Ind. Eng. Chem.*, 47, 258-67 (1955) February.

A report of investigations on drop formation and interfacial area as applied to liquid-liquid extraction processes. R. F. Bukacek

Flow Measurement

Oppenheim, A. K. and Chilton, E. G. PULSATING-FLOW MEASUREMENT — A LITERATURE SURVEY. *Amer. Soc. Mech. Eng. Trans.*, 77, 231-248 (1955) February.

Technical publications on the measurement of pulsating flow are reviewed. Problems related to pressure differential meters are classified and the operation and application of other types of meters to pulsating flow is discussed.
R. F. Bukacek

Fractionation

Etienne, A. (assigned to L'Air Liquide Societe Anonyme) PROCESS FOR SEPARATING FLUID MIXTURES INTO FRACTIONS OF DIFFERENT VOLATILITIES. U. S. 2,699,046 (1955) January 11.

This invention is an improvement on known rectification techniques for separating fluid mixtures. The method is claimed to result in lower power requirements. B. E. Eakin

Karwat, E. and Linde, R. (assigned to Gesellschaft fuer Linde's Eismachinen A.-G.) PROCESS FOR COOLING AND PURIFYING COMPRESSED GAS MIXTURES. U. S. 2,699,047 (1955) January 11.

A cyclic process is presented that is especially applicable to the separation of air by liquefaction into its components. Emphasis is placed on the removal of impurities from the air during condensation. B. E. Eakin

Heat Transfer

Andrews, R. V. SOLVING CONDUCTIVE HEAT TRANSFER PROBLEMS WITH ELECTRICAL-ANALOGUE SHAPE FACTORS. *Chem. Eng. Progress*, 51, 67F-72F (1955) February.

Only simple geometric shapes can be treated analytically in conductive heat transfer without using such complicated boundary conditions that solution becomes impractical or impossible to obtain. By the use of Langmuir's shape factor for conduction the solution of such problems is greatly simplified. Shape factors may be determined by electrical measurements of the configurations drawn to scale on conductive paper. R. E. Ellington

Katz, D. L., Myers, J. F., Young, E. H. and Balekjian, G. BOILING-OUTSIDE FINNED TUBES. *Petroleum Refiner*, 34, 113-116 (1955) February.

A general discussion of boiling phenomena is included with a design method comparing finned and plain tube evaporators, using boiling refrigerant on the outside and water inside of the tubes. W. G. Bair

Katz, D. L., Young, E. H., Williams, R. B. and Balekjian, G. HOW TO DESIGN ATMOS-

PHERIC COOLERS. *Pipe Line Ind.*, 53, 56-59 (1955) February.

Correlations of data on finned tube atmospheric coolers is presented based on information from 30 units representing a variety of configurations. R. F. Bukacek

Reman, G. H. EFFECT OF GAS AND SOLID MIXING IN FLUIDIZED BEDS ON CHEMICAL REACTIONS. *Chem. and Ind.* (British) No. 3, 46-51 (1955) January 15.

The article contains a brief discussion of the effect of gas solid mixing in fluid beds on the heat transfer and kinetics of chemical reactions. W. G. Bair

HEAT TRANSFER RATES FOR CROSSFLOW OF WATER THROUGH A TUBE BANK AT REYNOLDS NUMBERS UP TO A MILLION.

Sheehan, T. V., Schomer, R. T., and Dwyer, O. E. AVERAGE FILM COEFFICIENTS FOR INDIVIDUAL TUBES. Part I.

Sheehan, T. V. and Weisman, J. CIRCUMFERENTIAL VARIATION OF FILM COEFFICIENT FOR INDIVIDUAL TUBES. PART II.

Dwyer, O. E., Horn, F. L. and Weisman, J. FORCED CONVECTION BOILING AND PRESSURE DROP DATA. PART III. Amer. Soc. Mech. Eng. Papers No. 54-F-19, 20, 21 (1954) September.

Part 1 of a report of investigations on heat transfer rates for crossflow of water through a tube bank at Reynolds numbers up to a million. The coefficients were found to be greater than those presented by the Colburn equation, due to the fact that in the high Reynolds number range the coefficient varies with the 0.8 power of Reynolds number instead of 0.06 as indicated by the Colburn equation. Part 2 reports an investigation on the circumferential variation of the film coefficient for individual tubes at various locations in the tube bank. Only small variations were found. Part 3 reports the investigation on heat transfer rates under conditions of forced-convection boiling. The effects of pressure, heat flux and flow rate on the inception of nucleate boiling were determined as well as other information. R. F. Bukacek

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Computer Applications

Eggleston, G. E. and Brimley, D. E. HEAT-EXCHANGER SELECTION BY COMPUTATION MACHINE METHODS. Amer. Soc. Mech. Eng. Paper No. 54—SA-47 (1954).

In the selection of a proper heat-exchanger for an airplane, an IBM 701 data processing machine is used to solve the equations for the heat-transfer constraint of the exchanger and the penalty to the plane under given flight conditions. Output of the machine is given in graphical form. S. Hu

Oppenheim, A. K. RADIATION ANALYSIS BY THE NETWORK METHOD. Amer. Soc. Mech. Eng. Paper No. 54—A-75 (1954) November.

The network method of radiation analysis is applied to the problem of evaluating heat transfer characteristics in an enclosure comprising a number of gray heat transfer surfaces and filled with various diathermanous gray gases. The analysis is limited to diffuse radiation under steady state conditions. Techniques for solution of radiation networks by matrix algebra and analog computers are outlined. C. G. von Fredersdorff

Schwartz, H. A LOW COST ANALOG COMPUTER. *Can. Chem. Processing*, 39, 72, 74 (1955) January.

The analog computer is rapidly achieving the leading position in solution of control and process problems. It is most applicable to studies of dynamic systems that are a changing function with time. The computer will aid the engineer in determining critical process control points and in improving the system design. The computer frees the engineer from the necessity of many lengthy and time-consuming calculations. B. E. Eakin

Uhl, W. C. WHY A COMPUTER FOR REFINING? *Petroleum Processing*, 10, 189-191 (1955) February.

An all electronic digital computer built by the Electro Data Corp. was installed in the Paulsboro laboratories of Socony-Vacuum Oil Co.

in 1952. Problems of refinery design, optimum operating conditions, and long-range planning can all be handled by the machine. A problem that would usually take an experienced refinery engineer about two weeks to solve requires only about 15 minutes on the computer.

S. Hu

REFINERY USES DIGITAL COMPUTER. *Instruments and Autom.*, 28, 109 (1955) January.

Mobilac, an electronic digital computer built by Electro-Data Corporation, is being installed at Socony-Vacuum's Research and Development Laboratories at Paulsboro, N. J. The initial problem for the machine is determining the most efficient operating condition for the Paulsboro refinery. The refinery operations are represented by equations which will be fed to the computer on punched cards, along with oil characteristics data, available charge stocks, motor gasoline specifications, product commitments, and operating conditions and requirements. Many other uses of the computer are planned.

B. E. Eakin

Field Instrumentation

Welch, M. OIL-FIELD INSTRUMENTATION. *Instruments and Autom.*, 28, 119-123 (1955) January.

The instrument man in the oil field is much on his own. Good measurement and control, vital to the field operation, depends on proper choice of equipment, proper tools and facilities, and proper attitude of personnel. This résumé covers the basic variables, measurements at the well, control of pumping and gas-lift wells, and selection of equipment. Shop and field maintenance facilities are described in detail.

Author's Abstract

Flowmeter

Gehre, H. GAS FLOW MEASURING EQUIPMENT. U. S. 2,699,678 (1955) January 18.

This invention relates to a device for bleeding off a side stream of gas with flow meters in both main flow and side stream lines, the side stream meter being tied into the main stream meter. Such a device has application to remote indication of measurement and in volume correction where proportionality between the stream is necessary.

R. F. Bukacek

Gas Leak Detector

DETECTING COMBUSTIBLE GAS LEAKS. *Chem. Processing*, 18, 138, 139, 141 (1955) February.

An installation for detection of combustible gas in the atmosphere of Canton, Ohio's, sewage and garbage treatment plant is described. Up to 350,000 cu ft. of 600 Btu fuel gas is produced daily.

D. M. Mason

Instrument Maintenance

Mattix, E. D. REDUCE YOUR INSTRUMENT MAINTENANCE. *Oil Gas J.*, 53, 96-99 (1955) February 7.

The various points to watch for in planning an instrument maintenance and replacement program are outlined. Proper instructions for the operating personnel, and training, can result in considerable reduction in maintenance. A file on all instruments will help in locating weaknesses and points of frequent failure.

B. E. Eakin

Surge Tanks

Chilton, E. G., and Handley, L. R. PULSATION ABSORBERS FOR RECIPROCATING PUMPS. *Amer. Soc. Mech. Eng. Trans.*, 77, 225-230 (1955) February.

The design of gas-filled surge tanks for pumping liquids is described and discussed.

R. F. Bukacek

Well Pressure Recorder

Postlewaite, W. R., West, A. C., and Cavigli, H. J. ROTATING PISTON GIVES PRECISION TO NEW WELL DEPTH-PRESSURE RECORDER. *Oil Gas J.*, 53, 105-108 (1955) February 28.

The new precision well-pressure recorder developed by Standard Oil Co. of California is designed for a pressure range of 140 to 4720 psi. The instrument is capable of detecting changes in pressure of ¼ pound at 2400 psi with a maximum deviation of total pressure of about 0.053%, or 1 psi in 2000 psi. Special precautions must be observed with this instrument when calibrating or using for field tests.

B. E. Eakin

12. MATERIALS OF CONSTRUCTION

Cathodic Protection

Johnson, W. A. HOW TO DESIGN CATHODIC PROTECTION SYSTEMS. *Pipe Line Ind.*, 2, 58-60, 64 (1955) March.

General discussion of types of corrosion tests and the selection and design of cathodic protection systems. Three sample design calculations are included. G. G. Wilson

Waite, W. G. CATHODIC PROTECTION OF UNDERGROUND STRUCTURES. PART I. *Corrosion Techn.* (British) 2, 47-49 (1955) February.

General description outline of the methods, design techniques, and tests for effectiveness of cathodic protection. G. G. Wilson

Concrete

Southworth, G. B. CONCRETE MIXING AND PLACING. 11a. DESIGN AND CONTROL OF CONCRETE MIXES. *Construction*, 37, 102, 104, 107, 110, 112 (1955) February.

The author discusses an easy system of making mixes of various strengths and qualities, and day-to-day control when aggregate gradings vary. S. Volchko

Corrosion

Day, J. F. UNDERGROUND PIPELINE CORROSION AND CATHODIC PROTECTION. *Gas J.* (British), 281, 168-170, 176 (1955) January 19.

Brief, illustrated presentation of basic corrosion theory, types of corrosion cells encountered on underground pipelines, prevention of corrosion, corrosion testing on pipelines, and the economics of cathodic protection. G. G. Wilson

Henke, R. W. NOTES ON A SYSTEM FOR RATING PITTING CORROSION. *Corrosion*, 11, 50-53 (1955) January.

A system is proposed for describing corrosion pits in a metal surface by a combination of agglutinated numbers and letters coded to a schedule rating the five principal characteristics of pitting corrosion. The system would facilitate transmission of pitting data by providing a 10-digit number covering their depth, equivalent diameter (including those of irregular shape) area (expressed as a percentage of total surface), nature of pit walls and time (reduced to a standard interval). Pit depth is expressed as a percentage of material thickness rather than a finite dimension, walls would be rated vertical or gradual in comparison with a 45-degree angle and time would be in penetration per year. Area of pits as percentage of total area would be determined by placing over the pitted surface a transparent grid and comparing the area visually with a conventional standard delineating 10 stages of severity. Suggestions and recommendations for improvement of the system and submission of specimens of pitted material are solicited by the author. Author's Abstract

Parker, M. E. ECONOMICS IS A BASIC PROBLEM. *Pipe Line Ind.*, 2, 54-6, 65 (1955) March.

The economic bases underlying almost every decision made by a corrosion engineer are pointed out. The test is well illustrated. G. G. Wilson

Pfeil, L. B. METALLURGICAL ASPECTS OF DRY CORROSION. *Chem. and Ind.* (British), No. 9, 208-18 (1955) February 26.

Lecture delivered to the Corrosion Group of the Society of Chemical Industry in London. Includes a brief summary of the principles of dry corrosion and of present knowledge of high temperature corrosion effects on various heat resisting alloys. Specific needs for additional experimental data and the application of theoretical principles are indicated throughout the lecture. G. G. Wilson

Weld Inspection

Hovland, H. RADIOGRAPHIC INSPECTION OF PIPE LINE WELDS. *Petroleum Eng.*, 26, D32, 33, 35, 36, 38, 39 (1954) November.

Technological improvements of equipment and methods make radiographic inspection of pipeline welds imperative to attain better quality and greater economy. Evidence of the acceptance of radiographic inspection in pipeline construction is indicated by the increase from 82 miles of pipeline so inspected in 1945 to 12,515 miles in 1953. A. J. Tulis

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National Fire Protection Association Quarterly
National Gas Bulletin of Australia
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Oil and Gas Journal
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THERMODYNAMIC PROPERTIES OF METHANE-NITROGEN MIXTURES

A Presentation of the Thermodynamic Properties of Two Mixtures, 90% Methane—10% Nitrogen, and 70% Methane—30% Nitrogen, and a Demonstration of Use of the Data in Computing Energy Requirements of Nitrogen-Separation Processes

by
O. T. Bloomer
B. E. Eakin
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See Abstract on page 95 of this issue